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Roncus elbulli (Arachnida, Pseudoscorpiones), a new species from Cap de Creus Nature Park (Catalonia, Spain), with a key to the Spanish species of the genus *Roncus*

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Abstract

Roncus elbulli **sp. n.** is described from Cap de Creus Nature Park (Catalonia, Spain). The new species is morphologically close to *Roncus cadinensis* Zaragoza, 2007 (Barcelona province), but differs by being smaller in size and having a more robust chela with a different microsetae pattern. The new species seems to be restricted to coastal semiarid slopes with garrigue vegetation. A key to the Spanish species of the genus *Roncus* is provided.

Keywords

Pseudoscorpiones, Neobisiidae, *Roncus*, identification key, new species, Catalonia, Spain

Introduction

Three species of the genus *Roncus* L. Koch, 1873 have recently been described from Catalonia: *Roncus judsoni* Henderickx & Zaragoza, 2005 (eastern Pyrenees, province of Gerona), *Roncus cadinensis* Zaragoza, 2007 (Cadí-Moixeró Natural Park, province of Barcelona) and *Roncus montsenyensis* Zaragoza & Šťáhlavský (2008) (Montseny Natu-

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ral Park, province of Barcelona). Here we describe an additional new species of this genus from Cabo de Creus Natural Park, province of Gerona, Catalonia, Spain. This new discovery supports Zaragoza and Šťáhlavský's (2008) suggestion that more endemic species of *Roncus* remain undiscovered or misidentified in Northeast Spain, as well as in Southeast and Balearic islands (first author, pers. obs.). This study also reveals that the *Roncus* of Catalonia colonize diverse types of habitats and that this is partly responsible for their endemicity.

Material and methods

The specimens used for morphological study were dissected and examined as temporary glycerine mounts in cavity slides. After examination, the specimens were individually preserved in 70% ethanol inside glass vials, with the dissected appendages in glass microvials inside each vial. Microscopical examination was carried out with a Zeiss Axiolab light microscope, which was also used to take measurements of the appendages and make the drawings. SEM photographs were taken with a HITACHI S-3000N microscope. The measurements were based on Chamberlin's (1931) reference points; the length of the chela and its palm include the pedicel; all measurements are in millimetres. The ratios given are the length/width index of an article, when two articles are compared the ratio is the length/length index. The terminology follows Chamberlin (1931), including trichobothriotaxy, with modifications to the nomenclature of the segments of the pedipalps and legs (Harvey 1992). The terminology of faces of the appendages and the chelal spot-sensilla follows Judson (2007); the term "rallum" is adopted from Judson (2007) for the cheliceral flagellum. The formula of the setal rows of the carapace follows Gabbutt and Vachon (1967).

Abbreviations:

alt.	altitude.
av.	average measurements.
DEUA	Departamento de Ecología, Universidad de Alicante.
HHC	Hans Henderickx, personal collection.
MCNB	Museu de Ciències Naturals, Barcelona.
MHNG	Muséum d'Histoire naturelle de la Ville de Genève.
MNCNM	Museo Nacional de Ciencias Naturales, Madrid.
MNHNP	Muséum national d'Histoire naturelle, Paris.
NHMW	Naturhistorisches Museum Wien.
PT	pseudotactile seta (similar to tactile seta, but shorter).
TS	tactile setae.

Description

***Roncus elbulli* Zaragoza & Henderickx, sp. n.**
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(Figs 1-14, 16-18)

Type material. Male holotype: Spain, Catalonia, Gerona province, Cap de Creus Natural Park, Roses, Cala Montjoi, coordinates 42° 15' 29.75" N, 3° 13' 23.79" W, altitude 100m, under stones, 15 November 2005, leg. H. Henderickx (deposited in DEUA). Paratypes: (all from same location as the holotype or from neighbouring bay slopes "calas"; all collected by H. Henderickx): Cala Canadell, 42° 15' 11.99" N, 3° 14' 33.17" W, alt. 100 m, 2 males, 3 females, 29 October 2002 (1 male 1 female deposited in HHC, 1 male in MHNG, 1 female in DEUA, 1 female in MCNB); Cala Montjoi, 42° 15' 29.75" N, 3° 13' 23.79" W, alt. 100 m, 5 males, 15 November 2005 (1 male deposited in HHC, 1 male in MCNB, 1 male in MNCNM, 1 male in MNHNP, 1 male in DEUA); Cala Rostella, 42° 14' 42.42" N, 3° 13' 23.97" W, alt. 100 m, 2 males, 27 October 2003 (1 male deposited in DEUA, 1 male in NHMW); Cala Murtra, 42° 14' 32.92" N, 3° 13' 16.52" W, alt. 100m, 1 female, 31 October 2002 (deposited in MCNB); 1 male, 1 female, 29 November 2002 (male deposited in MNCNM, female in MHNG); 1 male, 1 female, 2 December 2002 (male deposited in NHMW, female in MNHNP); 1 female, 27 December 2003 (deposited in DEUA).

Diagnosis. Epigean *Roncus* with typical roncoid facies, robust palps, small in size. Carapace longer than broad, av.: 1.20×; epistome moderately prominent; chaetotaxy: 4-8-6-6: 24. Anterior process of coxa I with tooth shape, medial process without denticles. Palp femur granulated at the paraxial face but without tubercles, one tubercle at middle of antiaxial face; longer than either chelal finger or carapace; males 3.19-3.53×(0.56-0.67/0.17-0.20), females 3.20-3.48×(0.66-0.78/0.20-0.24). Patella smooth. Chela, males 2.99-3.16×(0.94-1.14/0.30-0.38), females 2.83-3.08×(1.11-1.34/0.38-0.47). Chelal finger longer than the hand. Chelal fixed finger with 60 (av.) teeth, movable finger 56 (av.). Without microsetae proximal to the trichobothrium *eb*. One or two, even without microsetae below trichobothria *eb* and *esb*.

Etymology. The species epithet, *elbulli,* is a noun in apposition and refers to the world-famous *Restaurante El Bulli*, which is located at the *locus typicus*, Cala Montjoi.

Description. The data correspond to the male holotype, followed by paratype males and females data in parentheses. Measurements and ratios in Table 1.

Opisthosomal pleura and legs yellowish, tergites slightly sclerotized. Carapace, chelicerae and pedipalps reddish.

Carapace (Fig. 3) longer than broad, widest at the middle. One pair of reduced eyes with flattened lenses 0.050 (0.050-0.065) mm long, situated 0.055 (0.058-0.086) mm from anterior margin. Epistome moderately prominent (Fig. 4), isosceles triangle-shaped, longest side opposite to apex (or equilateral), apex slightly rounded (or pointed), 0.016 (0.013-0.035) mm long and 0.025 (0.015-0.035) mm wide. Chaetotaxy: 24 (24-26) setae, formula: 4:6:8:6 (4:5-6:8-10:6). Glandular pores present, 3 (0-4) on

Table 1. *Roncus elbulli* sp. n.: measurements and ratios

***Roncus elbulli* sp. n.**	**♂ holotype**	**11 ♂ paratypes**	**7 ♀ paratypes**
Body	1.72	1.40-2.12	1.45-2.88
Carapace	1.21× (0.58/0.48)	1.13-1.25× (0.56-0.69/0.47-0.55)	1.15-1.27× (0.65-0.76/0.54-0.66)
Chelicera			
Hand	0.36/0.18	0.32-0.39/0.17-0.20	0.39-0.47/0.21-0.23
Finger	0.25	0.23-0.34	0.27-0.34
Palp			
Trochanter	1.98× (0.35/0.18)	2.00-2.28× (0.34-0.42/0.16-0.20)	1.95-2.13× (0.39-0.48/0.19-0.23)
Femur	3.19× (0.59/0.19)	3.19-3.53× (0.56-0.67/0.17-0.20)	3.20-3.48× (0.66-0.78/0.20-0.24)
Patella	2.09× (0.48/0.23)	2.10-2.27× (0.46-0.55/0.20-0.25)	2.07-2.30× (0.53-0.65/0.25-0.30)
Pedicel	0.16	0.16-0.19	0.17-0.21
Club	1.39× (0.32/0.23)	1.38-1.51× (0.30-0.37/0.20-0.25)	1.35-1.54× (0.36-0.44/0.25-0.30)
Club/pedicel	2.00×	1.87-2.06×	1.86-2.12×
Hand	1.46× (0.48/0.33)	1.36-1.52× (0.44-0.56/0.29-0.38)	1.42-1.53× (0.56-0.66/0.38-0.47)
Pedicel	0.09	0.07-0.10	0.09-0.11
Finger	0.56	0.51-0.63	0.57-0.70
Chela	3.01× (0.99/0.33)	2.99-3.16× (0.94-1.14/0.30-0.38)	2.83-3.08× (1.11-1.34/0.38-0.47)
Chela/carapace	1.71×	1.65-1.85×	1.71-1.81×
Femur/carapace	1.02×	0.96-1.06×	1.00-1.07×
Femur/finger	1.07×	1.02-1.11×	1.07-1.16×
Femur/patella	1.24×	1.18-1.29×	1.17-1.25×
Patella/hand	1.00×	0.94-1.02×	0.94-0.99×
Finger/hand	1.16×	1.07-1.19×	1.00-1.11×
Leg I			
Femur	3.00× (0.32/0.11)	2.92-3.27× (0.29-0.36/0.10-0.13)	2.96-3.20× (0.34-0.42/0.12-0.13)
Patella	2.66× (0.23/0.09)	2.48-2.80× (0.21-0.25/0.08-0.10)	2.31-2.68× (0.23-0.28/0.10-0.11)
Tibia	4.23× (0.28/0.07)	4.23-4.71× (0.28-0.33/0.06-0.08)	4.07-4.68× (0.31-0.37/0.07-0.08)

***Roncus elbulli* sp. n.**	♂ **holotype**	**11** ♂ **paratypes**	**7** ♀ **paratypes**
Basitarsus	2.57× (0.13/0.05)	2.60-2.95× (0.13-0.16/0.05-0.06)	2.55-2.77× (0.14-0.16/0.05-0.06)
Telotarsus	4.97× (0.23/0.05)	4.64-5.47× (0.21-0.26/0.04-0.05)	4.59-5.28× (0.23-0.29/0.05)
Femur/patella	1.36×	1.35-1.53×	1.36-1.58×
Telo-/basitarsus	1.76×	1.53-1.69×	1.51-1.78×
Leg IV			
Femur+patella	2.74× (0.55/0.20)	2.67-3.00× (0.51-0.61/0.18-0.22)	2.74-3.20× (0.59-0.69/0.20-0.24)
Tibia	5.17× (0.50/0.10)	5.18-5.46× (0.48-0.57/0.09-0.11)	5.01-5.50× (0.53-0.63/0.11-0.12)
Basitarsus	2.46× (0.17/0.07)	2.43-2.58× (0.16-0.20/0.07-0.08)	2.31-2.55× (0.20-0.21/0.08)
Telotarsus	4.63× (0.29/0.06)	4.58-4.88× (0.28-0.32/0.06-0.07)	4.40-4.79× (0.30-0.35/0.07-0.08)
Telo-/basitarsus	1.66×	1.59-1.79×	1.66-1.73×

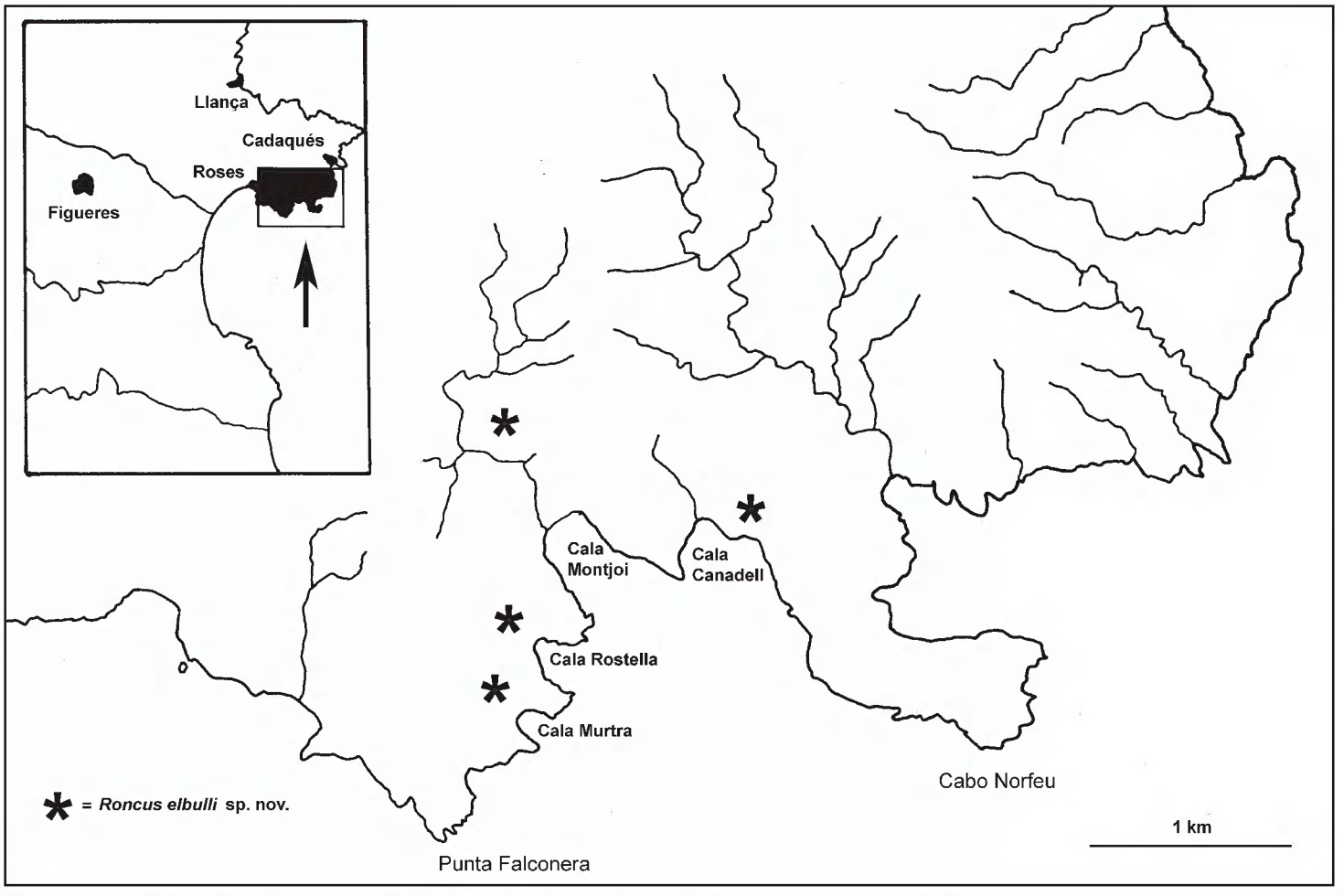


Figure 1. Map showing the bay slopes "calas" where *Roncus elbulli* sp. n. is found.

Figure 2. Habitus of *Roncus elbulli* sp. n. (Cap de Creus, October 2002).

each side between anterior and ocular zones. One microlyrifissure close to each eye and one on each side of the posterior zone.

Coxal area. Manducatory process with 4 (3-4) setae; palpal coxa with 8 (7-9) setae, pedal coxa I with 8 (6-8) setae, II: 6-7 (6-7), III: 5 (4-6), IV: 7-9 (7-9). Anterior process of coxa I (Fig. 5) with simple tooth shape, apically pointed (seldom culminating in two denticles), 0.023 (0.015-0.030) mm long and 0.015 (0.015-0.023) mm broad; medial process straight, not prominent, without denticles.

Tergal chaetotaxy I–X: 6:10:11:11:11:11:11:11:11(4 PT):9(4 TS) (5-8:9-11:10-11:11:11:11-12:11-12:11-12:11:9-10). Segment XI with 10 setae, 6 of which are tactile setae. Anal cone with 2 dorsal and 2 ventral setae. Male genital area with 14 (11-19) setae on sternite II; sternite III with 14 (13-19) setae, 5 (5-9) of them along posterior margin of genital opening; genital opening with 2+2 internal setae. Female genital opening with 6-9 microsetae on sternite II and 11 on sternite III. Chaetotaxy of sternites IV–X: 8:13:14:14:13:14:14(2 PT) (8-10:11-15:12-14:12-14:12-14:12-14:12-13:9-11-14). Three microsetae on each stigmata of sternites III and IV.

Chelicera (Figs 6-7) with 6 setae on hand (one male with 7 on both chelicera) and one seta on movable finger, 0.66× (0.64-0.71) from base. Without granulation at base of movable finger. Spinneret is a flattened hyaline tubercle (slightly lower in males than in females) with 4 silk ducts. Fixed finger with 4 (4-9) apical protuberances and 12 (9-

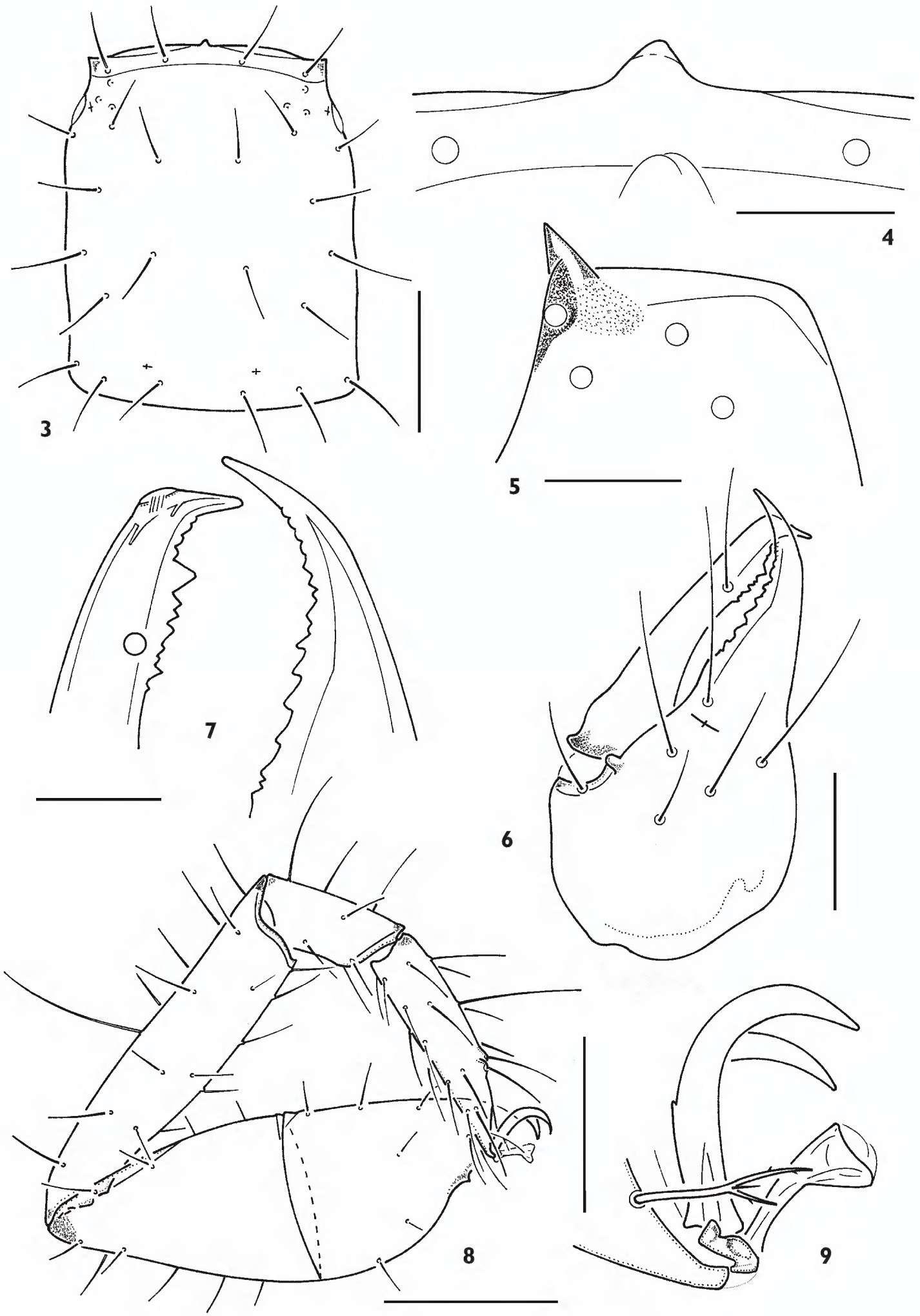
14) medium and small size teeth; movable finger with 3 (1-5) apical protuberances and 9 (8-11) teeth, 1 (1-2) of large size. Rallum with 8 (7-9) denticulate blades, length of proximal blade about one third that of others; serrula exterior with 26 (25-28) blades, serrula interior with 22 (22-25) blades.

Palps (Figs 10-12, 16-18), trochanter with one robust tubercle and two small protuberances on antiaxial face; with tiny dorsal denticulation in distal half; paraxial face of femur completely granulated but without tubercles, one tubercle at middle of antiaxial face, one glandular pore mediodistally, measurements (av.): 3.37×(0.62/0.18), females 3.28×(0.71-0.22). Patella smooth, one (one or two) micropores at base of pedicel, some lyrifissures as shown in Fig. 10. Chela (Figs 11, 12, 16-18) (av.): males 3.06×(1.05/0.34), females 2.96×(1.22/0.41); two male specimens from Cala Montjoi and both males from Cala Rostella have a chelal ratio >3.10× and show a shorter chelal length of <1.00 mm. Paraxial face of hand granulated at base of fixed finger, one pore at antiaxial face close to finger base; two (one or two) micropores at base of dorsal face of pedicel; ratio length chelal finger/hand, av.: males 1.16×, females 1.06×. Fixed finger with 60 (57-69) teeth up to level of trichobothrium *ib*; *nodus ramosus* at level of 5th (4-6th) distal tooth; distance between trichobothria *ib* and *ist* 1.76 (1.46-2.27) times longer than that between *ist* and *it*; two (0-2) microsetae below trichobothria *eb* and *esb* (Figs 13, 14, 17), sometimes one microsetae is also found clearly distal of *eb*, but it is slightly longer and is not considered to belong to this group; one lyrifissure at level of trichobothria *eb*, *ib* and *et*, one on the paraxial face of the hand close to finger base. One sensillum near the tip of both fingers. Movable finger with 54 (51-59) teeth, ending at level of trichobothrium *b* (or just distal); distance between trichobothria *sb* and *st* 1.04 (0.86-1.06) longer than distance *b–sb*; one sensillum (*p*1) close to dental margin, above or slightly distal of trichobothrium *sb*, another sensillum (*p*2) distal of *sb* (more or less close to trichobothrium, but always distal); two ventral glandular pores distal and proximal to *sb*; one lyrifissure basal of trichobothrium *b*, one between *b* and *sb* and one slightly basal, level with or even distal of *sb*; one female paratype from Cala Canadell shows a teratological absence of trichobothrium *b*.

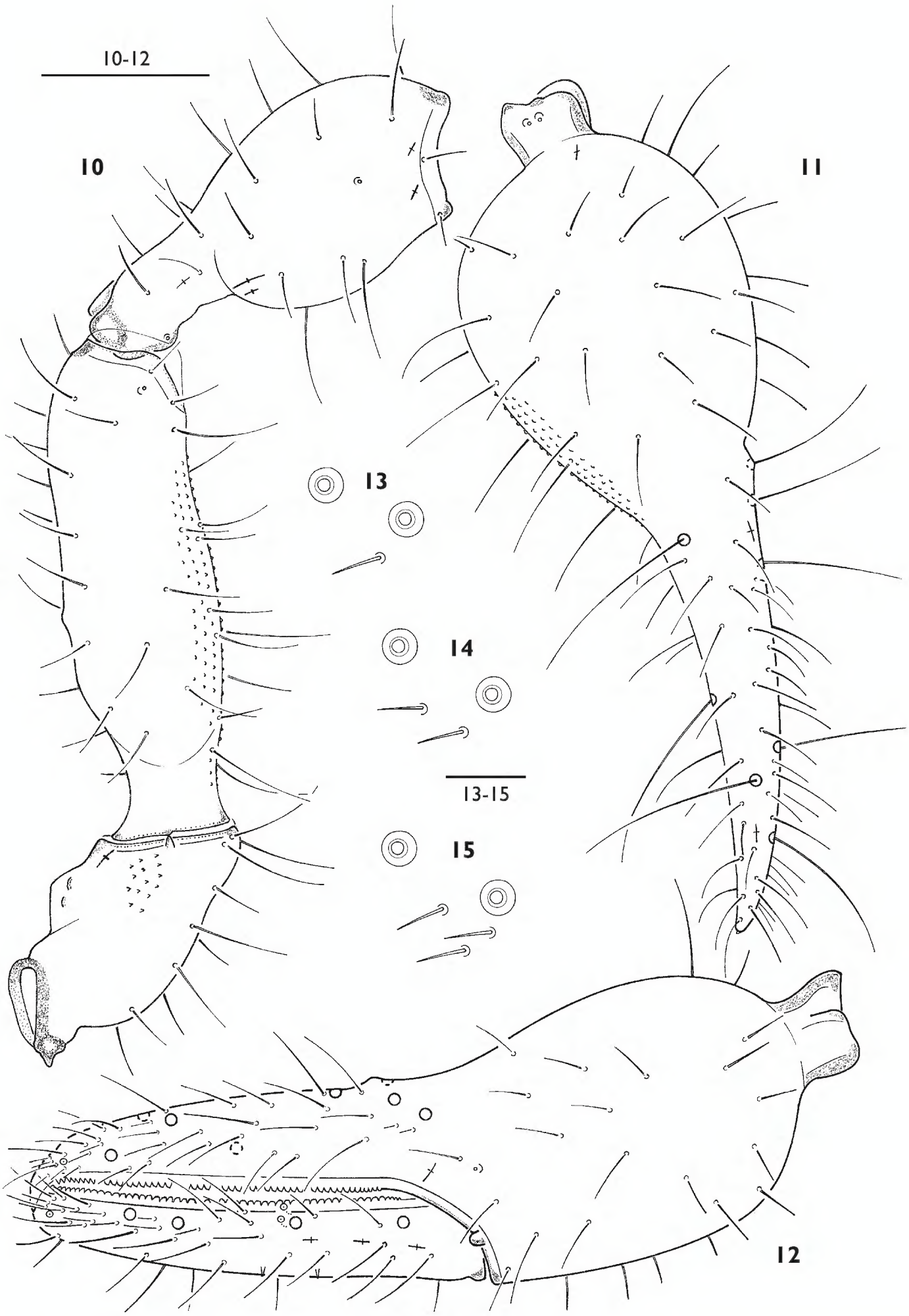
Claws of legs I and IV (Fig. 9) with a tiny tooth at middle of dorsal side. Leg IV (Fig. 8) tibia TS ratio >0.50, typical for *Roncus* (Zaragoza 2008): 0.53 (0.51-0.66), basitarsus TS ratio 0.19 (0.14-0.21), telotarsus TS ratio: 0.36 (0.32-0.39); subterminal setae (Fig. 9) 0.048 (0.048-0.068) mm long, with three rami, the longest [L=0.023 (0.021-0.033)] and the next longest [L=0.013 (0.013-0.020)] with scarce spinules, the shortest [L=0.004 (0.05-0.008, apically broken in many specimens)] smooth.

Distribution. The new species has been located on four slopes of the bay "calas", between Cabo Norfeu and Punta Falconera, Rosas, Cap de Creus Natural Park. Starting at the Restaurant 'El Bulli' (Cala Montjoi), a small steep path climbs up the slope to an altitude of 100 m, where the new *Roncus* species was found. Although several other locations on the Cap de Creus peninsula were sampled, the species was only found on the southern slopes.

Biology. The new species lives under stones in the garrigue, a semiarid environment that is exposed to the sun. This habitat is new for the genus in Spain: *Roncus* species in this country are usually found in humid forests or in caves, although some



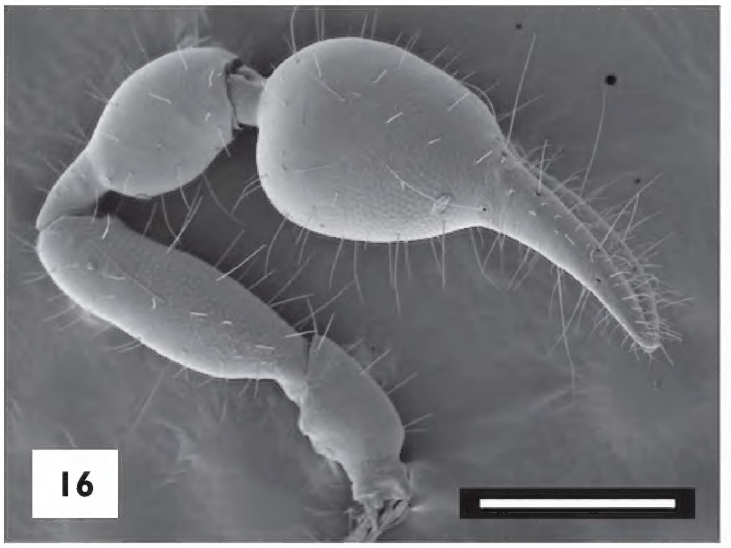
Figures 3-9. *Roncus elbulli* sp. n., male holotype. 3. carapace; 4. anterior margin of carapace, showing epistome; 5. anterior and medial processes of coxa I; 6. left chelicera; 7. fingers of left chelicera, partial view; 8. right leg IV, lateral view; 9. distal end of tarsus and apotele of left leg IV, lateral view. Scale bars (mm): 0.05 (Figs 4, 5, 7, 9), 0.10 (Fig. 6), 0.20 (Figs 3, 8).

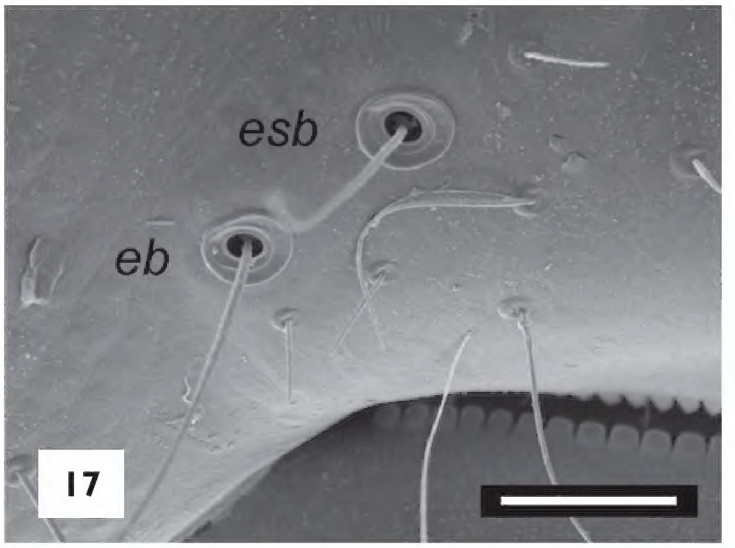


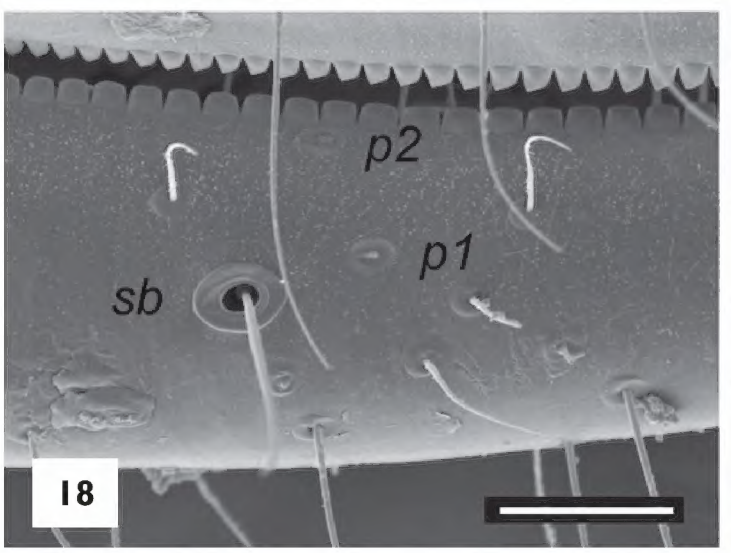
Figures 10-15. *Roncus elbulli* sp. n., male holotype (except where otherwise noted): 10. left palp, without chela, dorsal view; 11. left chela, dorsal view; 12. left chela, lateral view; 13. male paratype, chelal microsetae pattern below trichobothria *eb/esb*. 14. chelal microsetae pattern below trichobothria *eb/esb*. Scale bars (mm): 0.05 (Figs 13-14), 0.20 (Figs 10-12). 15. *Roncus cadinensis* Zaragoza, 2007, male holotype: chelal microsetae pattern below trichobothria *eb/esb*. Scale bar (mm): 0.05.

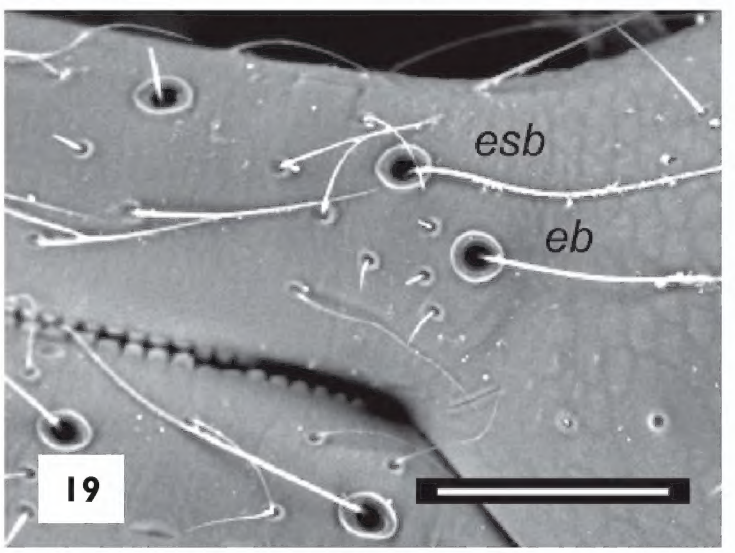
other Mediterranean species had been reported from the garrigue and xeric habitats (e.g. Gardini 1981, 1991). The new species seems to have found a seasonal niche: all specimens were found during the short humid period in the middle of the winter. The Cap de Creus peninsula bears several endemic invertebrates and another probably endemic pseudoscorpion, *Allochernes deceuninckorum* Henderickx & Vets 2003, has been described from the southern slopes (Henderickx and Vets 2003).

Remarks. Following Mahnert's (1977) key and recent papers of Henderickx and Zaragoza (2005), Zaragoza *et al.* (2007) and Zaragoza and Šťáhlavský (2008), amongst the *Roncus* species from Spain with a roncoid form, the new species belongs to the group with a robust palpal femur (ratio <4.00×). It most closely resembles *Roncus cadinensis* Zaragoza, 2007, recently described from Catalonia. In general, these two species are morphologically very close, but some distinctive characteristics are found: the average palpal chela ratio is 3.06 (1.05/0.34) in males of the new species, but 3.34 (1.17/0.35) in *R. cadinensis*; the paraxial face of the chelal hand is more convex in the new species; the average palpal femur length is 0.62 in males of *R. elbulli* sp. n., versus about 0.69 in *R. cadinensis*; carapaceal epistome more prominent (av.: 0.020 mm long)









Figures 16-19. *Roncus elbulli* sp. n., female paratype, Cala Canadell. SEM photographs: 16. left palp, dorsal view; 17. chelal microsetae pattern below trichobothria *eb/esb*; 18. fingers of the chela, antiaxial face, partial view, showing trichobothrium *sb* and sensilla *p*1 and *p*2 on movable finger. *Roncus cadinensis* Zaragoza, 2007, male paratype. SEM photograph: 19. chelal microsetae pattern below trichobothria *eb/esb*. Scale bars (mm): 0.05 (Figs 17, 18), 0.10 (Fig. 19), 0.50 (Fig. 16).

and pointed in the new species, as opposed to short (av.: 0.014 mm long) and rounded in *R. cadinensis*. On average, the distance *ib-ist* is 1.86× distance *ist–it*, and the distance *sb–st* is 0.98× distance *b–sb* in the new species, whereas in *R. cadinensis* the distance *ib-ist* is 1.56× distance *ist–it*, and the distance *sb–st* is 1.13× distance *b–sb*. The chelal microsetae pattern, as defined by Zaragoza and Šťáhlavský (2008) for the microsetae below trichobothria *eb* and *esb*, is reduced in *R. elbulli* sp. n.: some specimens bear only one or two microsetae (Figs 13, 14, 17), two specimens lack microsetae on one chela and one male lacks them on both chelae; *R. cadinensis* usually bears three or four microsetae in the same area (Figs 15, 19) (only one female of *R. cadinensis* with two microsetae between *eb-esb* and one level with *esb*, the latter being considered as part of a group of three microsetae).

There is also an important difference in the habitat preferences of the two species: *R. cadinensis* occurs at 950-1400 m altitude in gallery forest and pine forest (*Pinus sylvestris*) biotopes, whereas *R. elbulli* sp. n. occurs at 100 m altitude in the garrigue relatively close to the coast.

Roncus pugnax (Navás, 1918) was previously the only Spanish species with a chelal ratio of about 3.00 (Beier 1963). This species shows wide variation in morphometry (Beier 1939) and it might represent a "complex" of different species. However, all specimens assigned to *R. pugnax* have long chelal appendages (femur >0.90 mm, chela >1.70), much longer than those of *R. elbulli* sp. n.

Concerning the western Mediterranean species of the genus, *R. elbulli* sp. n. differs from the French epigean species included in Gardini's keys (1982, 1991). *Roncus binaghii* Gardini, 1991 (mainland France and Italy) coincides in having short palps, but the length/breadth ratios are higher than in the new Spanish species (e.g. male chela 3.25 and hand 1.66 on average in *R. binaghii*). *R. binaghii* also differs in having the femur the same length as the finger and denticles on the medial process of coxa I. According to the keys of Gardini and Rizzerio (1985, 1986) and Gardini (1991, 1992, 1993) for the numerous mainland Italian species, *R. elbulli* sp. n. groups with the species with 6 setae on the carapaceal posterior row, medial process of coxa I without denticles, palpal patella smooth, palpal femur without tubercles on paraxial face and short chelal appendages. These characteristics again lead to *R. binaghii*, which has been discussed above.

Among the epigean species from Sardinia, *R. elbulli* sp. n. resembles *Roncus abditus* (J.C. Chamberlin, 1930) and *Roncus caralitanus* Gardini, 1981, both species with short palpal segments and a chela ratio of about 3.00× (Gardini 1981; Gardini and Rizzerio 1985, 1987). *R. caralitanus* and *R. duboscqi* differ from *R. elbulli* sp. n. in having the carapace as long as broad (*R. elbulli* sp. n. av.: 1.20×), a higher chelal hand ratio in males (>1.60×, versus <1.50×, av.: 1.47×), the chelal finger equal in length to the hand in the males (longer than hand in *R. elbulli* sp. n.), and fewer teeth on the chelal fingers (<50, as opposed to 57-69 on fixed finger and 51-59 on movable finger in *R. elbulli* sp. n.).

Key to the Spanish species of the genus *Roncus*

Note: *Roncus caballeroi* Lagar, 1974, is not included because the original description is insufficient and does not give measurements.

1 Species with roncoid facies, epigean or troglophile, eyes present with more or less flattened lenses, palps robust **2**

– Species with parablothroid facies, troglobitic, eyes reduced to spots or absent, palps slender **10**

2 Palpal femur 2.89-3.54 times longer than broad **3**

– Palpal femur 3.80-4.80 times longer than broad 7

3 Chela with microsetae proximal to trichobothrium *eb* ..... ***Roncus lubricus* L. Koch, 1873**
(epigean; NW Europe; presence in Spain doubtful, due to misidentification).

– Chela without microsetae proximal to trichobothrium *eb* **4**

4 Palpal chela about 1.80 mm long, femur about 1.00 mm long..... ***Roncus pugnax* (Navás, 1918)**
(epigean; provinces of Barcelona, Castellón, Gerona, Tarragona, Valencia, Zaragoza and Balearic islands)

– Palpal chela 1.10-1.40 mm long, femur 0.56-0.82 mm long..... **5**

5 Carapace as long as broad, epistome prominent and pointed ..... ***Roncus caralitanus* Gardini, 1981**
(epigean; Sardinia, Sicily; doubtful presence in Balearic islands).

– Carapace longer than broad (about 1.20×), epistome low or moderately prominent..... **6**

6 Chela about 3.00 times longer than broad and femur about 0.60 mm long in males, chela with 0-2 microsetae below trichobothria *eb-esb*..... ***Roncus elbulli* sp. n.**
(epigean; province of Gerona)

– Chela about 3.35 longer than broad and femur about 0.70 mm long in males, chela with 3-4 microsetae below trichobothria *eb-esb* ..... ***Roncus cadinensis* Zaragoza, 2007**
(epigean; province of Barcelona)

7 Palpal femur longer than 1.00 mm (1.07-1.55), patella and hand about 1.00 mm long..... ***Roncus neotropicus* Redikorzev, 1937**
(epigean and troglophilic; Balearic islands)

– Palpal femur 1.00 mm long or shorter, patella and hand about 0.80 mm long or less..... **8**

8 Chelal microsetae pattern with increased number of microsetae (8-10) below *eb-esb* ..... ***Roncus judsoni* Henderickx & Zaragoza, 2005**
(troglophilic; province of Gerona)

– Chela with 2-5 microsetae below *eb-esb* **9**

9 Palpal femur at most 4.00 times longer than broad in males (0.72-0.73 mm long); chela 1.17-1.28 mm long; chela with 4-5 microsetae below *eb-esb* ..... ***Roncus montsenyensis* Zaragoza & Šťáhlavský, 2008** (epigean; province of Gerona)

– Palpal femur 4.24-4.30 times longer than broad in males (0.84-0.98 mm long); chela 1.47-1.69 mm long; chela with 2-4 microsetae below *eb-esb* ..... ***Roncus duboscqi* Vachon, 1937** (epigean; France; doubtful records from Spanish provinces: Barcelona, Gerona)

10 Larger number of setae on carapace (about 50) ..... ***Roncus setosus* Zaragoza, 1982** (troglobitic; province of Alicante)

– Lower number of setae on carapace (maximum 25) **11**

11 Small species, palpal femur 1.00 mm long or less **12**

– Large species, palpal femur 1.18-1.83 mm long **13**

12 Palpal femur 4.65 times longer than broad and longer than chelal finger ..... ***Roncus bellesi* Lagar, 1972** (troglobitic; province of Lérida)

– Palpal femur 5.20 times longer than broad and as long as chelal finger ..... ***Roncus juvencus* Beier, 1939** (troglobitic; province of Tarragona)

13 Epistome low, chelal femur 6.20-6.50 times longer than broad (1.72-1.83 mm long), chela with pedicel 5.40 times longer than broad ..... ***Roncus lagari* Beier, 1971** (troglobitic; province of Tarragona)

– Epistome prominent, chelal femur 4.09-5.40 times longer than broad (1.18-1.59 mm long), chela with pedicel 3.41-5.10 times longer than broad **14**

14 Palpal trochanter without tubercle ..... ***Roncus hibericus* Beier, 1939** (troglobitic; province of Barcelona)

– Palpal trochanter with more or less prominent tubercle **15**

15 Palpal femur clearly shorter than the chelal finger, femur 5.10-5.40 times longer than broad (1.29-1.54 mm long), finger 1.40-1.60 mm long ..... ***Roncus vidali* Lagar, 1972** (troglobitic; Balearic islands)

– Palpal femur as long or longer than the chelal finger **16**

16 Palps moderately slender: palpal femur longer than the finger and 4.09-4.49 longer than broad (1.26-1.33 mm long); patella 2.52-2.62 times longer than broad (0.99-1.15 mm long), chelal hand 1.55-1.59 times longer than broad (0.90-1.06 mm long) ..... ***Roncus boneti boneti* Beier, 1931** (troglobitic; province of Alicante)

– Palps slender: palpal femur same length as finger and 4.83-5.25 times longer than broad (1.42-1.48 mm long), patella 2.96-3.14 times longer than broad (1.18-1.23 mm long), chelal hand 1.87-2.01 times longer than broad (1.15 mm long) ..... ***Roncus boneti tarbenae* Mahnert, 1977** (troglobitic; province of Alicante)

Discussion

Gabbutt and Vachon (1967) pointed out difficulties in the taxonomy of the genus *Roncus*, due to the inadequate help that morphometry provides in discriminating between species. Gardini (1981, 1983) emphasized this problem and the need for finding distinctive new characteristics. Recently, Henderickx and Zaragoza (2005) and Zaragoza and Šťáhlavský (2008) expressed similar opinions and the latter showed that karyological analysis can be an invaluable aid in confirming the discrimination of species.

The chelal microsetae pattern has been shown to be of great help for distinguishing closely related species, accompanied by other characteristics. Gardini (e.g. 1981, 1983) emphasized the presence or absence of microsetae proximal to the trichobothrium *eb* and Gardini and Rizzerio (1985, 1986) used this characteristic as the first distinction point for their keys. Henderickx and Zaragoza (2005), Zaragoza *et al.* (2007) and Zaragoza and Šťáhlavský (2008) also showed the utility of the number of microsetae lying below trichobothria *eb* and *esb*. The latter characteristic has been used above to compare *R. elbulli* sp. n. with allied species from Catalonia. At least for this region, this characteristic presents a constant range for each of the species recently discovered; in *R. elbulli* sp. n. all the 19 specimens studied show a single pattern. Zaragoza (2008) found that different chelal microsetae areas can be distinguished in other neobisiid genus (*Roncocreagris* Mahnert, 1974) and expressed the opinion that these might act as "sensory fields".

Endemicity is common in most of the epigean *Roncus* species (Gardini, 1981); some apparently widespread species, e.g. *R. lubricus* (Gardini 1983), have since been shown to have more restricted distribution areas after new morphological characteristics have been considered. The Sardinian species *R. abditus* and *R. caralitanus* are very probably endemic (Gardini 2000; Zaragoza *et al.* 2007; Zaragoza and Šťáhlavský 2008), despite records in literature (Harvey 2008) from mainland France and Italy, Corsica and Sicily (*R. abditus*) and Balearic islands (misidentified, first author, pers. obs.) and Sicily (*R. caralitanus*). *R. pugnax* has been recorded as widespread in some eastern Spanish regions (Aragón, Balearic islands, Catalonia and Valencia; Zaragoza 2007), but Beier (1939) found that some specimens from Catalonia show variation in palpal parameters and it is likely that they belong to different, undescribed species (first author, pers. obs.). In recent years three species have been described from Catalonia: *R. judsoni*, *R. cadinensis* and *R. montsenyensis*, the latter two probably belonging to a single phyletic lineage, as confirmed by karyological analysis (Zaragoza and Šťáhlavský 2008). *R. elbulli* sp. n. seems to belong to the same lineage, although karyological data are not yet available for this species. The ability of the species to adapt to and colonize diverse types of habitats seems the main cause of endemicity in this genus.

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